

Vascular reconstruction at the groin: oblique or vertical incisions?

John F Chester MS FRCS

Senior Surgical Registrar

Christopher M Butler MS FRCS

Senior Surgical Registrar

Epsom District Hospital, Epsom, Surrey

Robert S Taylor MS FRCS

Consultant Vascular Surgeon

Key words: Vascular reconstruction; Groin wound; Incision

Incisions for vascular access at the groin are usually vertical. Because such incisions cross the moist skin-crease area and disrupt lymphatics, they may be more prone to infection than oblique incisions placed above and parallel to the groin crease. To determine whether this was the case, 149 patients undergoing vascular reconstruction through a groin incision over a period of 30 months were studied. Those with previous groin incisions were excluded, and where an incision was necessary in both groins, each wound was studied separately.

Over a 10-day postoperative period 5 of 85 vertical wounds developed infection with purulent discharge, whereas no oblique wounds ($n=82$) became infected ($P=0.032$). Oblique incisions for vascular access at the groin are associated with a decreased incidence of wound infection compared with conventional vertical incisions.

Incisions in or across the groin are liable to infection because the moist skin crease may harbour bacteria (1,2). In addition, any incision which damages underlying lymphatics draining a distal focus of infection related to gangrene or ischaemic ulceration will be more liable to bacterial contamination (3,4).

Oblique incisions above and parallel to the groin crease afford adequate exposure of the femoral vessels for vascular reconstruction with little disturbance of groin lymphatics and excellent healing characteristics (5,6). It is customary, however, for vascular access at the groin to be achieved through vertical incisions which, while providing excellent exposure, inevitably cut across lymphatics (7–10).

We compared wound infection rates in oblique and vertical incisions used for access to the femoral vessels for vascular reconstruction over a period of 30 months.

Methods

A total of 149 patients undergoing vascular reconstruction through a groin incision over a period of 30 months were studied. Patients who had undergone previous vascular surgery through a groin incision were excluded.

There were 65 females and 84 males aged between 48 and 88 years (median 70 years). Of these, 105 patients (70%) were, or had recently been smokers, and 29 (19%) were diabetics, eight requiring insulin. Forty-two (28%) presented with severe intermittent claudication, and 107 with rest pain. Of those with rest pain, 27 (25%) had gangrene.

Patients were randomised by drawing cards, producing equivalent groups with respect to age, sex, smoking history, diabetes mellitus, indication for surgery and operation planned (Table I). One-half of the patients underwent groin exploration through a vertical incision over the common femoral artery; the other half were explored using an oblique incision 2 cm above and parallel to the inguinal ligament. All patients received 500 mg flucloxacillin and 80 mg gentamicin preoperatively, and three postoperative doses, flucloxacillin at 6 hourly, and gentamicin at 8-hourly intervals.

Groin wounds were reviewed by an independent observer at 4, 7 and 10 days postoperatively, and classified into two groups: (1) clean or (2) infection with serosanguinous or purulent discharge. Suture line erythema, which occurred commonly, was ignored. Microbiological swabs were taken for culture of any wound discharge.

Table I. Type and number of operations carried out through oblique or vertical incisions

Operation	Vertical incision	Oblique incision
Femoropopliteal bypass (reversed saphenous)	30	29
Femoropopliteal bypass (PTFE)	27	22
Femorodistal bypass	2	9
Aortobifemoral bypass	7	8
Axillobifemoral bypass	3	2
Femorofemoral crossover graft	3	1
Total	72	71
	(85 wounds)	(82 wounds)
(excluding patients dying within 10 days of surgery)		

When patients required bilateral groin explorations, each wound was treated separately for the purposes of the study. Statistical comparisons were made using Fisher's exact test.

Results

Six patients died within 10 days of surgery, four from myocardial infarcts, and two from cerebral haemorrhage. All had clean wounds up to their death, and all six were excluded from the study. All remaining patients undergoing bilateral groin explorations had individual assessments made of each wound during the postoperative period, so that a total of 85 vertical and 82 oblique wounds were studied (Table I).

The 67 patients with vertical wounds (93%) and 71 with oblique wounds (100%) had clean, dry suture lines throughout the postoperative period. Five vertical wounds (5.9%) became frankly infected with purulent discharge and cultures yielded *Staphylococcus aureus* in all cases, whereas all oblique wounds remained dry ($P = 0.032$) (Table II).

All patients developing wound infections originally presented with rest pain and gangrene. One required a below-knee femoropopliteal bypass graft using PTFE; two more needed above-knee femoropopliteal bypasses,

Table II. Classification of wound status over a 10-day period after arterial surgery through a groin incision

	Clean	Infection with purulent discharge
Oblique incision (n = 71; 82 wounds)	82	0
Vertical incision (n = 72; 85 wounds)	80	5*
Total (n = 143; 167 wounds) (excluding patients dying within 10 days of surgery)	162	5

* $P = 0.032$; infection in vertical vs oblique wounds

again using PTFE; a fourth underwent an aortobiprofunda graft using Dacron®, and the remaining patient underwent a PTFE femorofemoral crossover. Both patients with bilateral groin incisions developed infection on only one side. In all cases wound swabs grew *Staphylococcus aureus*, and all infected wounds were treated by removing the skin sutures to facilitate wound drainage, and administering systemic flucloxacillin. No wounds required irrigation and no grafts needed removal. All wounds eventually healed satisfactorily.

Discussion

The primary function of an incision is to provide appropriate access. Exposure of the femoral vessels in the groin has, therefore, customarily been through a vertical incision crossing the groin crease (7–10). Such incisions may divide lymphatics draining a distal focus of infection related to gangrene or ischaemic ulceration with a resultant increase in wound infection (3,4).

An oblique incision placed parallel to and slightly above the inguinal ligament allows adequate exposure of the femoral vessels, including the profunda femoris artery. Healing characteristics are better with a reduced incidence of infection, because the incision does not cross or lie in the moist groin area and allows dissection of the femoral vessels with less lymphatic disturbance.

The use of an oblique incision for vascular access at the groin is not new; other authors have described it but no comparison has previously been made of infection rates between the oblique and vertical approaches (5,6). Our study of 149 patients documents no infection in the oblique wound group, but an infection rate of 5.8% in the vertical wound group.

We have now adopted the oblique incision for routine vascular exploration at the groin, and its continuing use on our unit has confirmed the improved healing characteristics with less wound infection than would have been expected using the more conventional vertical approach.

References

1 Bouhoutsos J, Chavatzas D, Martin P, Morris T. Infected synthetic arterial grafts. *Br J Surg* 1974;61:108–11.
2 Szilagy DE, Smith RF, Elliott JP, Vrandecic MP. Infection in arterial reconstruction with synthetic grafts. *Ann Surg* 1972;176:321–33.
3 Chester JF, Fergusson CM, Chant ADB. The effect of cephradine prophylaxis on wound infection after arterial surgery through a groin incision. *Ann R Coll Surg Engl* 1983;65:389–90.
4 Balas P, Pagratis N, Giamarellou E. The role of inguinal lymph nodes in the development of infections in reconstructive arterial procedures in the groin. *Int Angiol* 1984;3:499–502.
5 Spratt JS, Schieber W, Duward BM. *Anatomy and Surgical Technique of Groin Dissection*. St Louis: CV Mosby Co, 1965:24.

- 6 Hamman JL, Jermgan WR, Muller FB, Fulton RL. Oblique incision of the groin for vascular reconstruction at the femoral level. *Surg Gynecol Obstet* 1983;157:80–81.
- 7 Haimovich H. *Vascular Surgery Principles and Techniques*. New York: McGraw-Hill, 1976:406.
- 8 Wylie EJ, Stoney RJ, Ehrenfeld WK. *Manual of Vascular Surgery*. New York: Springer-Verlag, 1980;1:120.

- 9 Bergan JJ, Yao JST. *Operative Techniques in Vascular Surgery*. New York: Grune & Stratton, 1980:12.
- 10 Cooley DA, Wukasch DC. *Techniques in Vascular Surgery*. Philadelphia: WB Saunders, 1979:136.

Received 10 July 1991

Notes on books

Ophthalmology in Medicine: An Illustrated Clinical Guide by David Abrams. 286 pages, illustrated. Martin Dunitz Limited, London. 1990. £39.95. ISBN 0 948269 42 1

This is a book for the non-specialist. It is designed to be a quick reference to those eye conditions that are frequently met in general surgical practice. Surgeons in training and established consultants will find much of interest—it is the sort of book that could with profit be kept on the ward. The many colour photographs are of notably high quality.

Manual of Internal Fixation: Techniques Recommended by the AO-ASIF Group edited by M E Müller, M Allgöwer, R Schneider and H Willenegger. 3rd edition. 750 pages, illustrated. Springer-Verlag, Berlin. 1991. DM348.00. ISBN 3 540 52523 8

A greatly expanded and completely revised edition of a now standard work. All orthopaedic surgeons using AO techniques will require this volume on their shelves for reference and for guidance.

Surgical Diseases in Pregnancy by L A Cibils. 208 pages, illustrated. Springer-Verlag, Berlin. 1990. DM124.00. ISBN 0 387 97203 X

During pregnancy the mother may develop acute appendicitis, inflammatory bowel disease, renal calculi or various types of malignant tumour. This book discusses how best these patients should be managed. There are also chapters on complications of pregnancy and pregnancy in a kidney transplant recipient.

Arterial Grafting for Myocardial Revascularization: Indications, Surgical Techniques and Results by Ludwig K von Segesser. 146 pages, illustrated. Springer-Verlag, Berlin, 1990. DM126. ISBN 3 540 52596 3

Written by a surgeon with considerable personal experience of coronary artery revascularization, this monograph shows the

possibilities and limitations of using the internal mammary artery for this procedure rather than a saphenous vein. Anatomy, pathology, technique and results are given.

Recent Advances in Surgery—Number 14 edited by I Taylor and C D Johnson. 276 pages, illustrated. Churchill Livingstone, Edinburgh. 1991. £19.95. ISBN 0 443 04403 1

Topics in gastroenterology, peripheral vascular surgery, oncology and audit are just some of the many subjects discussed in this latest volume of a popular series. Recommended reading for all general surgeons.

Surgical Management of the Diabetic Patient edited by Michael Bergman and Gregorio A Sicard. 407 pages, illustrated. Raven Press, New York. 1991. \$112.50. ISBN 0 88167 720 5

This book gives practical information regarding the detailed assessment of the diabetic patient from the early stages when surgery is first considered, through the surgical procedure itself to the post-surgical convalescent period. Twenty-nine chapters, each authoritative and well referenced.

Atlas of Hernia Surgery by George E Wantz. 230 pages, illustrated. Raven Press, New York. 1991. \$144.00. ISBN 0 88167 724 8

Large clear drawings illustrate this new atlas on techniques of hernia repair. Of special interest to surgeons in training.

Lipoplasty: the theory and practice of blunt suction lipectomy edited by Gregory P Hetter. 2nd edition. 448 pages, illustrated. Little Brown and Company, Boston. 1990. £115.00. ISBN 0 316 35918 1

Nine new chapters have been added to the second edition of this popular book on plastic surgery of body fat. There are also many new illustrations. There is little doubt that this edition will be as successful as its predecessor.